

Linear Infrastructure Networks with Ecological Solutions

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Total budget: 5,540,485 Euro
UE contribution: 3,324,303 Euro

The LIFE LINES project began on 01/08/2015 and
had its completion scheduled for 31/07/2020.



LIFE LINES (LIFE14 NAT/PT/001081)
Linear Infrastructure Networks with Ecological Solutions
60% co-financed project by the LIFE - Nature and
Biodiversity Program of the European Commission

COLABORATING
ENTITIES



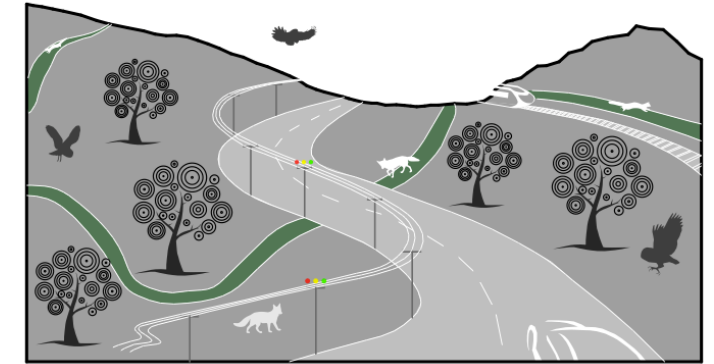
COORDINATING BENEFICIARY

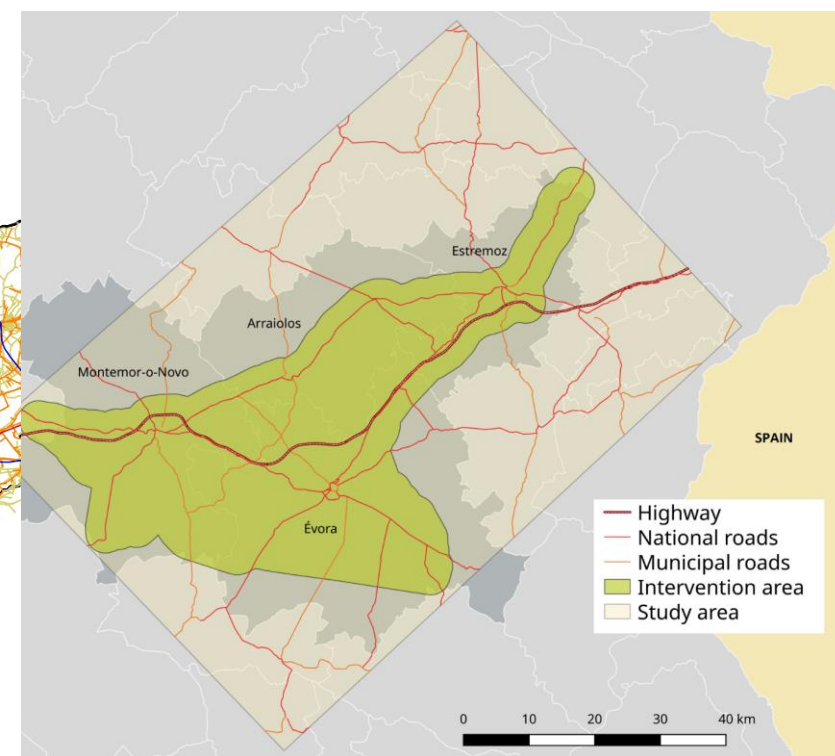
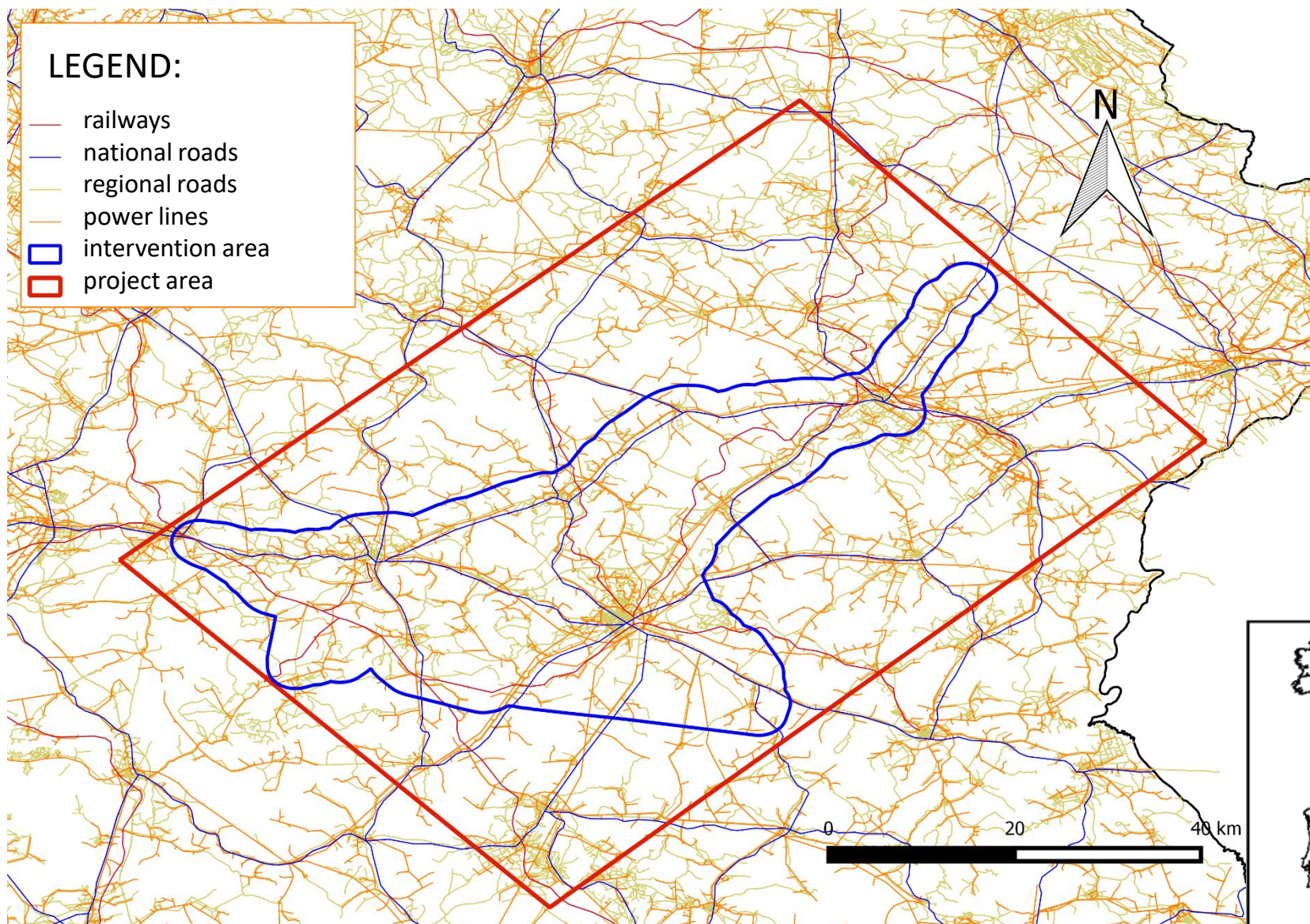
ASSOCIATED BENEFICIARIES



Its main goals are:

- Promote landscape **connectivity**;
- **Reduce** wildlife **mortality** by electrocution, collision and roadkills;
- Create biodiversity **corridors** and refuges;
- Detect and control **exotic and invasive** vegetation;
- Implement a national **database** of wildlife mortality;
- Inform and raise **awareness** of the citizens to the impacts of linear infrastructures on biodiversity





7 Preparatory Actions (A)

- Completing and updating of **baseline characterization** and performing **additional studies needed**, along with licensing and contracting procedures for actions C

10 Conservation Actions (C)

- mostly based on **demonstrative and innovative solutions**;

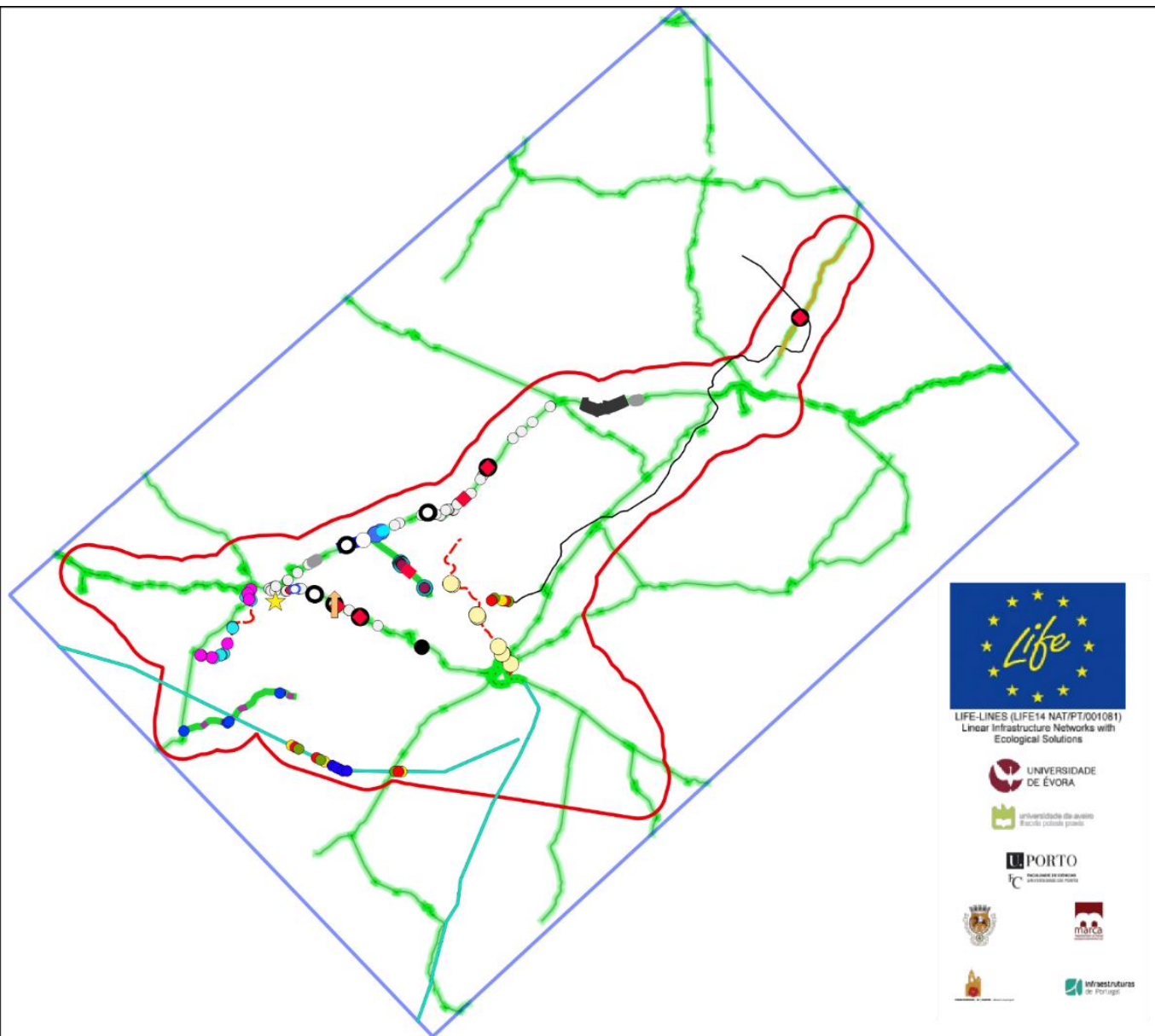
3 Monitoring Actions (D)

- comprises **considerable monitoring efforts** aiming to evaluate the effects of the implemented measures on biodiversity, in ecosystem functioning and at socioeconomic level

11 Awareness and Result Dissemination Actions (E)

4 Project Management Actions (F)





- Action C1**
- ↑ Wall to elevate fly height in N114 road
 - Amphibian barriers in N114 road
 - Amphibian mortality hotspot in N114 road
 - Owl wall in M 529 road
 - Light reflectors for owls
 - Sound mitigation for owls
 - Sound to put away owls' prey
 - Vegetation cut in road verges (measure for owls)
 - Strawberry Tree wall
 - ◆ Culverts with dry ledge
 - ◻ Culverts with fencing
 - ▨ Narrow mesh for rabbits
 - Mesh in "L" shape
 - Microreserve fencing
 - ★ Plant nursery
- Action C2**
- Microreserve in EN4 road
 - Location of exotic vegetation eradication in national roads
 - Management of road verge vegetation
- Action C7**
- Amphibian culverts in M529 road
 - Amphibian barriers for M529 road
 - Amphibian mortality hotspots for M529 road
 - Microreserves in CME Ecotrail
 - Canna (Arundo donax) eradication along CME Ecotrails
- Action C8**
- Amphibian culverts in M535 road
 - Amphibian barriers in M535 road
 - Eradication of exotic vegetation in CMMN Ecotrail
 - Microreserves in CMMN Ecotrail
- Action C10 - Biodiversity islands in powerline base poles**
- intervenção normal
 - sem qualquer tipo de ação
 - só vedado
 - stepping stone
 - Very high voltage power lines (REN)
 - Power lines (REN Estremoz)
 - Roads
 - Ecotrails
 - ◻ Intervention area
 - Study area

Of the 10 conservation actions:

- 5 actions include interventions in the linear infrastructures
- in dozens of locations



Implementation of **dry ledges** (side walkways) in existing **hydraulic passages** (drainage culverts).



Allows **all year long crossing** by wildlife, including when passages can be flooded (rainy months).

Results

Roadkills of mammals near the intervened culverts decrease after the interventions

+

nº of culverts crossings increasing for some carnivores after the placement of the fences



 **Infraestruturas
de Portugal**



See Oral presentation “IP’s participation in LIFE LINES: Reducing Faun Roadkills and Defragmenting Habitats” for additional information

See Oral presentation “Dry pathways and flowing water within culverts jointly promote crossings by carnivore mammals” for more information



Implementation of **natural barriers of strawberry trees** and **artificial metallic mesh**.



Increase of flight height of owls, passerines and bats



See Oral presentation “IP’s participation in LIFE LINES: Reducing Fauna Roadkills and Defragmenting Habitats” for additional information

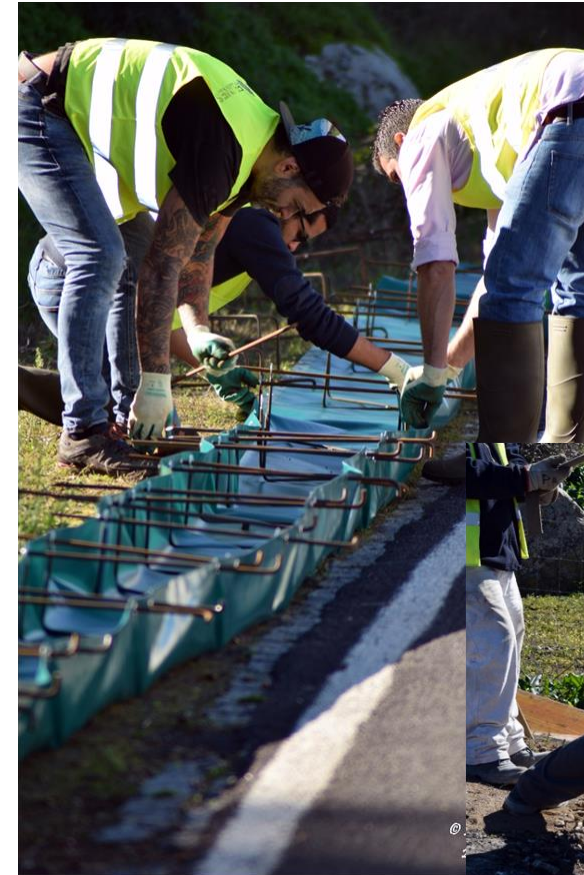
Construction of **routing barriers** and **specific passages** for amphibians and small mammals.



Minimize the mortality of these animals by allowing them to cross the road safely



RESULTS:
reduction of
amphibians' mortality
(up to 90%)



See Oral presentation "Effectiveness of amphibian mitigation measures to reduce roadkills in low traffic roads" for more information



Development and implementation of **devices** that produce **sounds and ultrasounds** when detecting approaching animals



promote the deterrence of animals from roads and power lines, reducing mortality by roadkill or by electrocution.

RESULTS:

Some showed promising results, like the Dissuasion device for large birds (black kites and corvids)



Installation of **reflectors** (National road EN4) for **detering owls from approaching the road**.



See Oral presentation "IP's participation in LIFE LINES: Reducing Fauna Roadkills and Defragmenting Habitats" for additional information



system for collect images in roads **to automatically identify road killed animals**.



1st prototype



2nd prototype



See oral presentation "Mobile mapping system (MMS2) for detecting Roadkills" for more information



prototype developed to reduce the mortality of medium and large birds by collision and electrocution in medium voltage lines.



RESULTS:

Still monitoring but results are showing a decrease in bird mortality of 80% in the 13km intervened

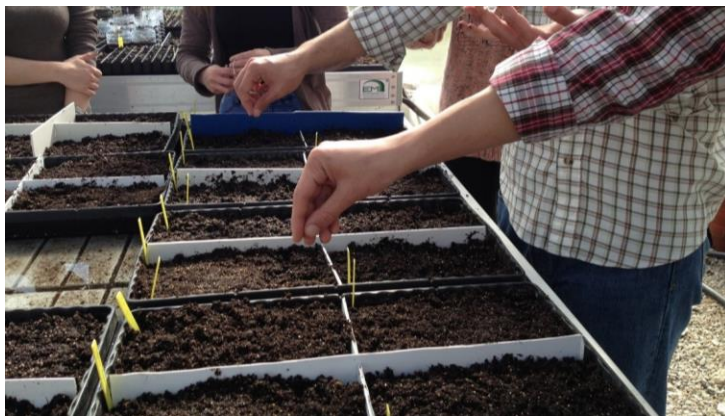


Rehabilitation of a greenhouse and installation of a **plant nursery**.



RESULTS:

Seeds collected produce the plants
The nursery 30000 seeds germinating or growing > 8000
plants of 100 different species.



Develop seed mixtures of native plant
species and with interest for conservation



Results:

**8 new protocols of species germination with
conservation interest, 153 species with harvested
seeds and 23 intervention essay areas.**



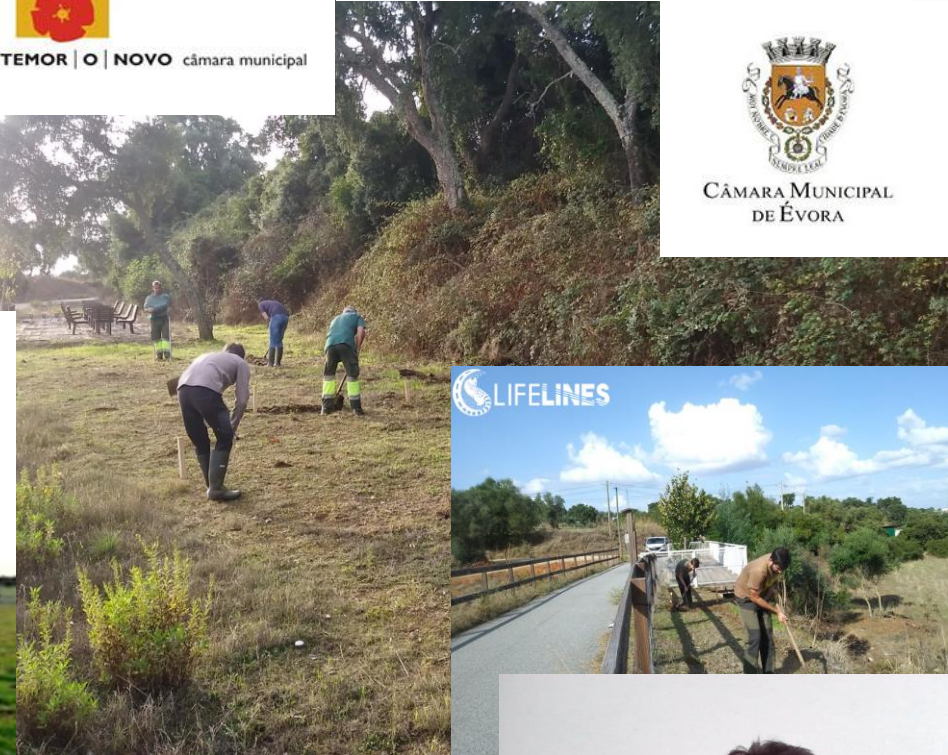
Implementation of **micro-reserves** by managing vegetation (selective cut, removal of exotic species, sow and plantation of native plants)



Creation of **refuge areas** for many species of flora and fauna, increasing biodiversity.

RESULTS:

- Increase in the diversity and richness of native flora species;
- Increase in richness and abundance of small mammals and butterflies



See Oral Presentation "Can power line poles bases be used as habitat promotion?" for more information

See Oral presentation "IP's participation in LIFE LINES: Reducing Fauna Roadkills and Defragmenting Habitats" for additional information



Control actions on exotic and invasive flora (*Acacia sp.*, *Arundo donax*, *Ailanthus altissima* and *Robinia pseudoacacia*) along the roads and eco-trails.



The control of these species was done using improved techniques, minimizing the use of herbicides.

RESULTS:

Giant reed (*A. donax*) control has been partially successful, increase in the richness and diversity of native species.

See Oral presentation "IP's participation in LIFE LINES: Reducing Fauna Roadkills and Defragmenting Habitats" for additional information



- **Methodology BACI** (Before-After-Control-Impact)
- Most monitoring surveys are **seasonal**
- **two years monitoring** evaluation.

Monitoring Roadkills are being monitored by:



Some monitoring still ongoing

The monitoring of the **mortality** of medium and large birds in **medium voltage lines** will go on **until march 2021**

The monitoring of the **flora** actions was mostly accomplished (**in some plots and interventions of invasive plants control in Spring 2021**).





Monitoring roadkills - MOVE

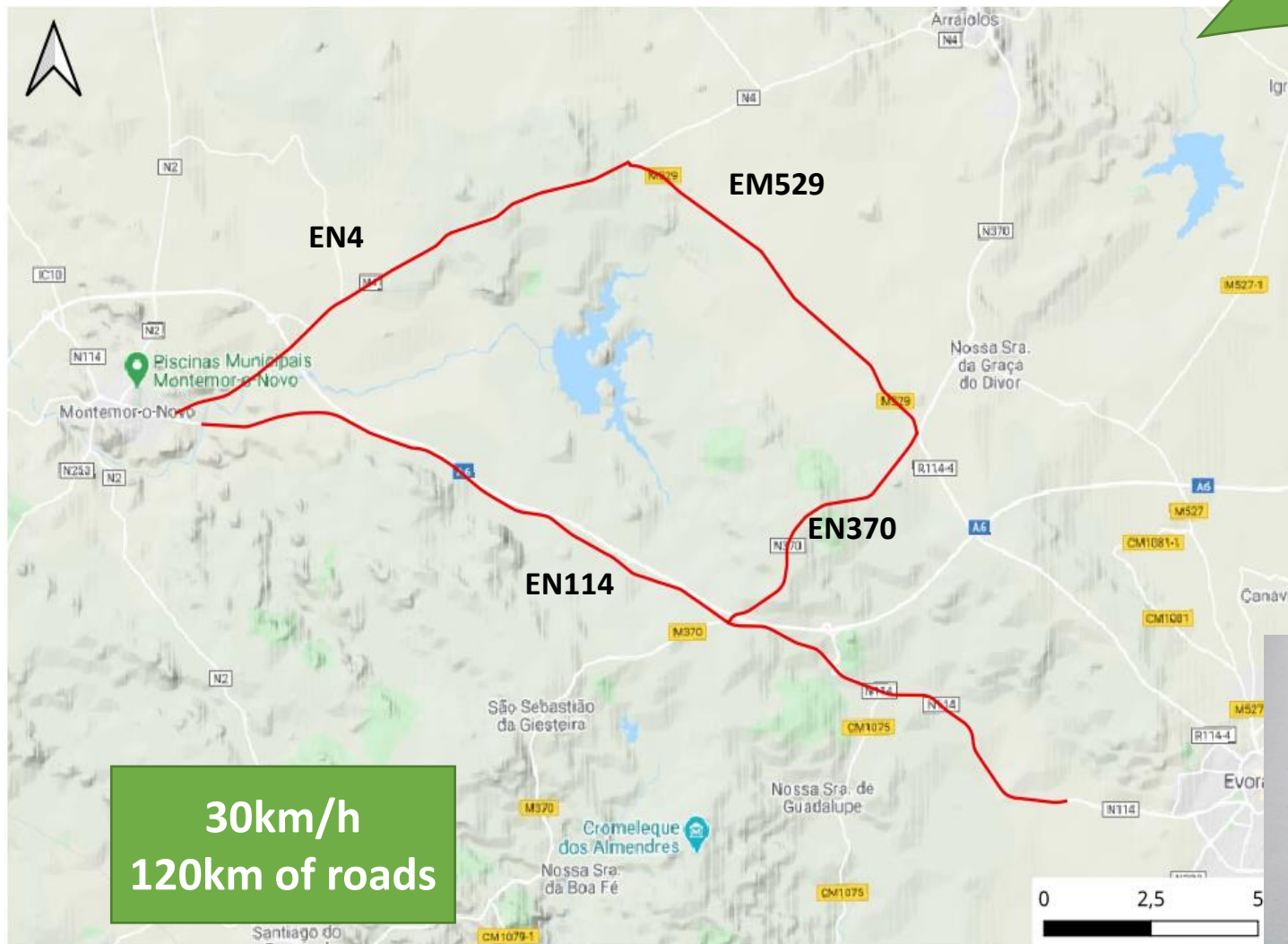
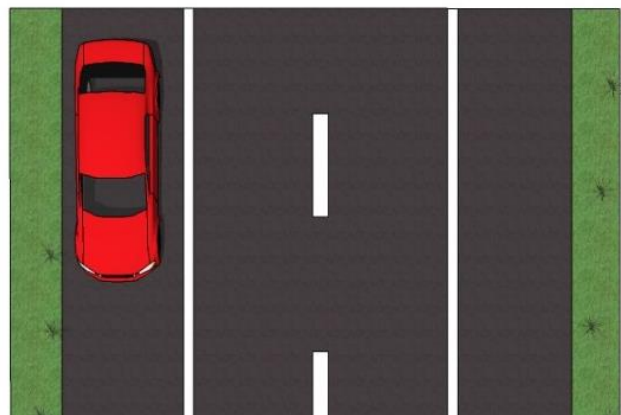


Assessment of the effects of roads on fauna

Since
2005

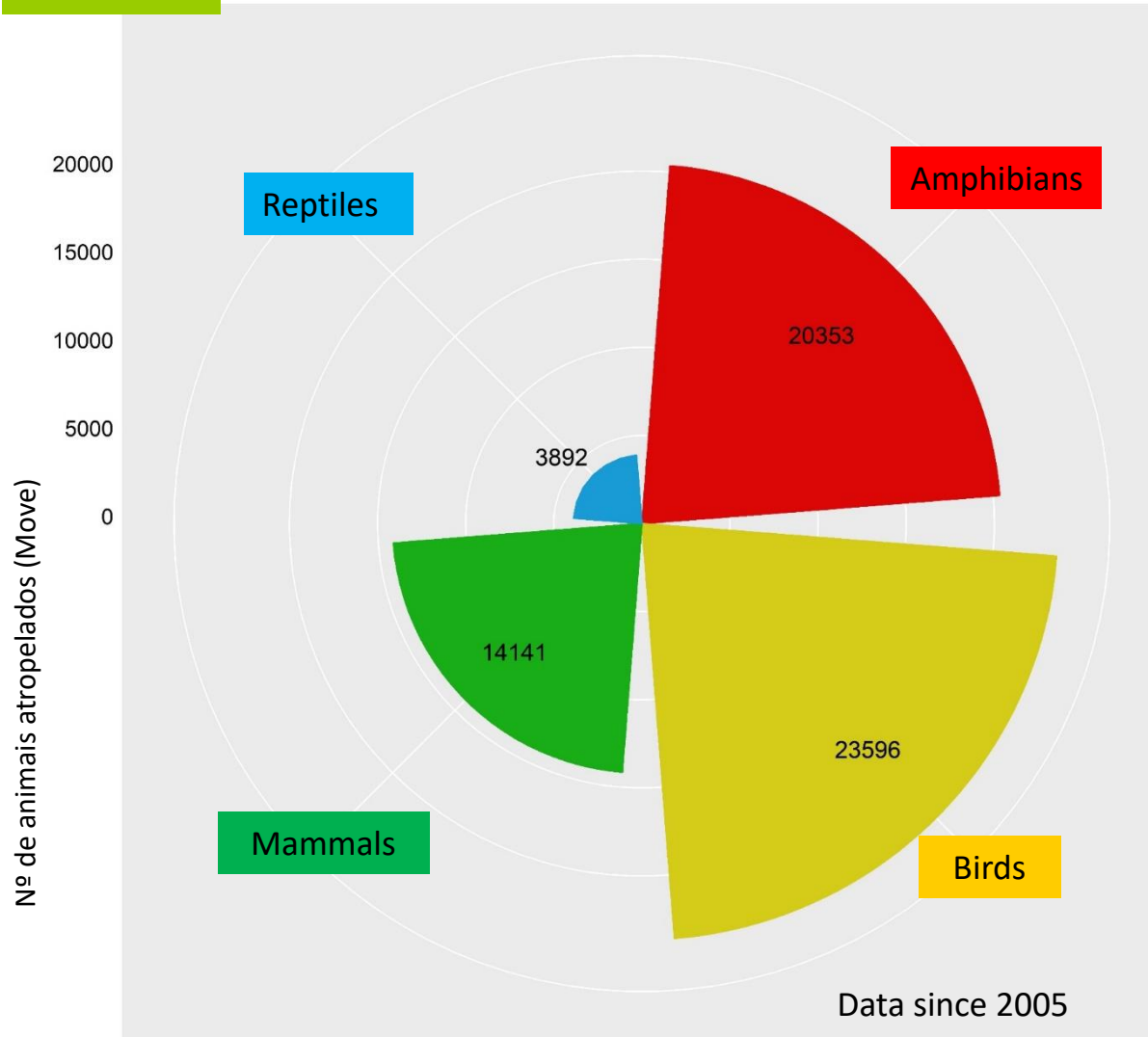


365 days/year



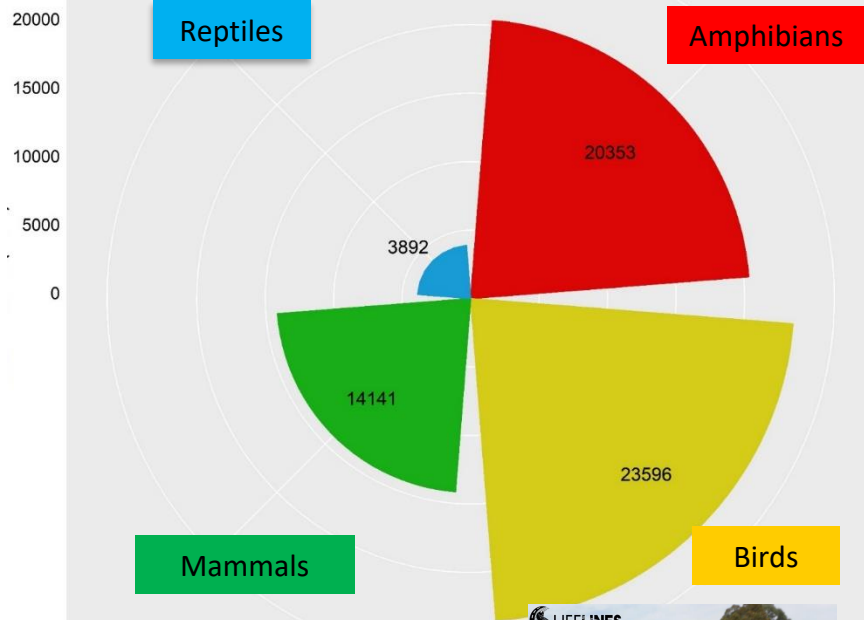
30km/h

Most affected fauna groups



30km/h

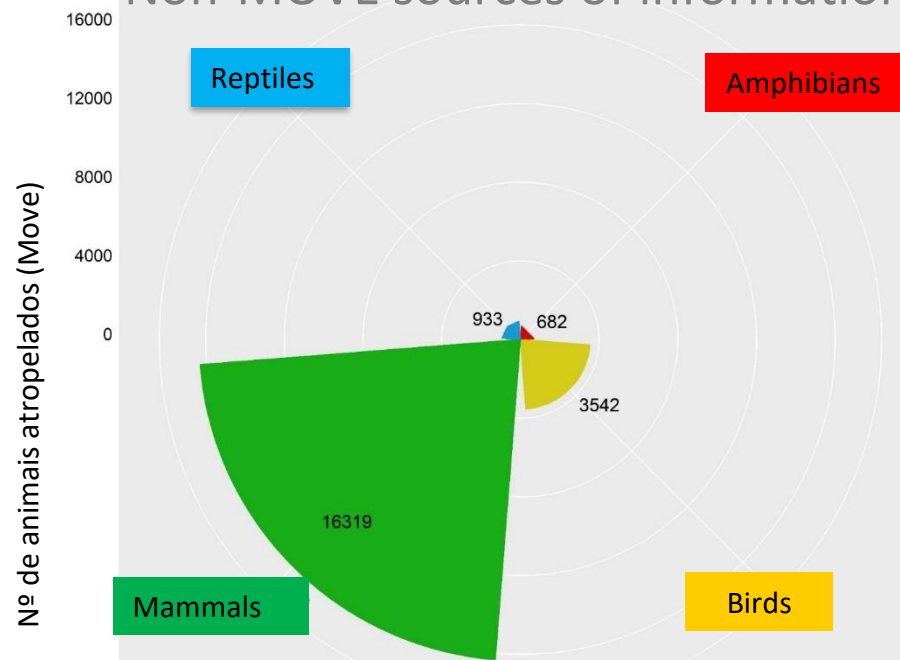
Move



Monitoring velocity matters

≈70km/h

Non-MOVE sources of information



National Roadkill Database



See Oral presentation "IP's participation in LIFE LINES: Reducing Fauna Roadkills and Defragmenting Habitats" for additional information on roadkill database



Promotion of **awareness actions** (workshops, seminars, contests for young people and voluntary actions...).



Involve society in nature conservation projects



Associação de Desenvolvimento Local

See Oral presentation "Implementation of volunteer environmental programs" for additional information



WORKSHOP

"The importance of fauna roadkills for the conservation of biodiversity and road safety"



6 workshops, 152 participants



Cofinanciado por:



Programa LIFE - Infraestrutura e Soluções Ecológicas

Apoio:



Rede de Infraestruturas Lineares com Soluções Ecológicas

Controlo de Espécies de Flora Invasora no Projeto LIFE LINES

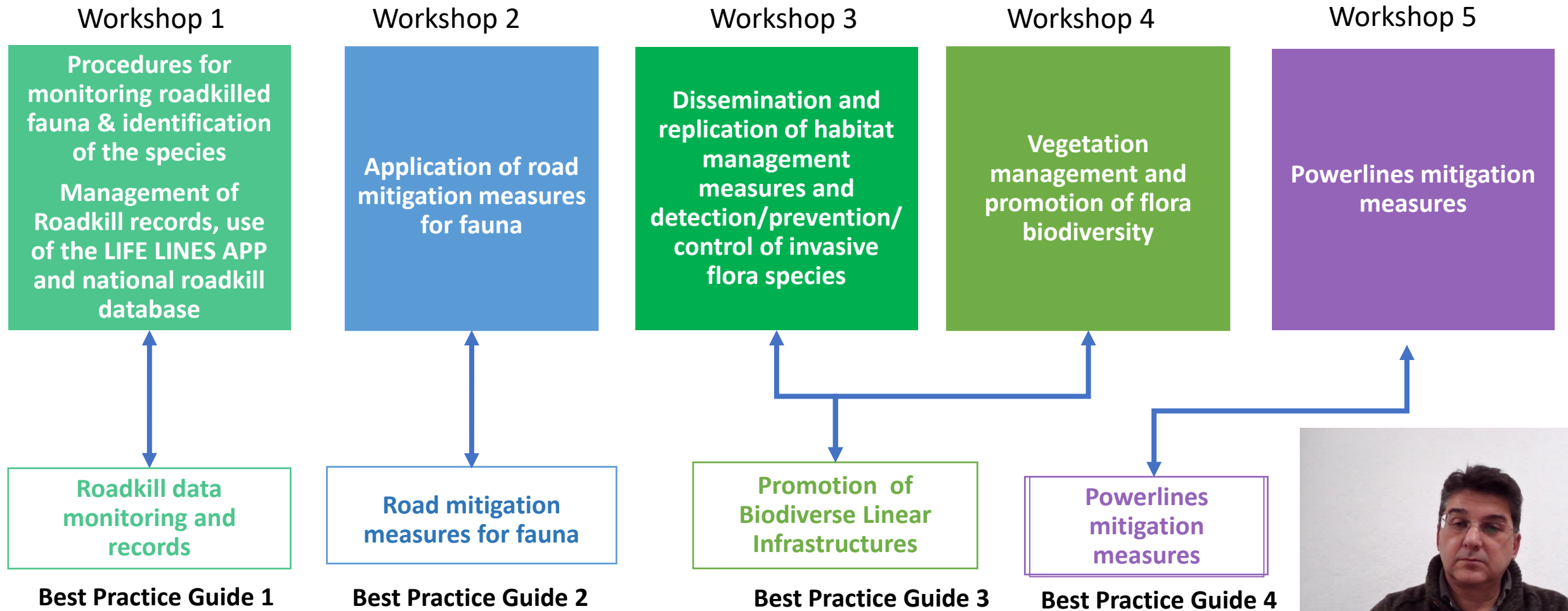
Mariana P. Fernandes, Paula Matano, Carla Pinto-Cruz, Anabela D.F. Belo



SEMANA NACIONAL SOBRE ESPÉCIES INVASORAS
10 a 18 de Outubro



Best Practices Guides & Workshops



new legislation (DL20/2018) requires to cut vegetation on roads to reduce fire ignition risk

However, for the LIFE LINES intervention area, some general considerations were included in the document “Criteria for vegetation management on road verges aiming to promote biodiversity”.

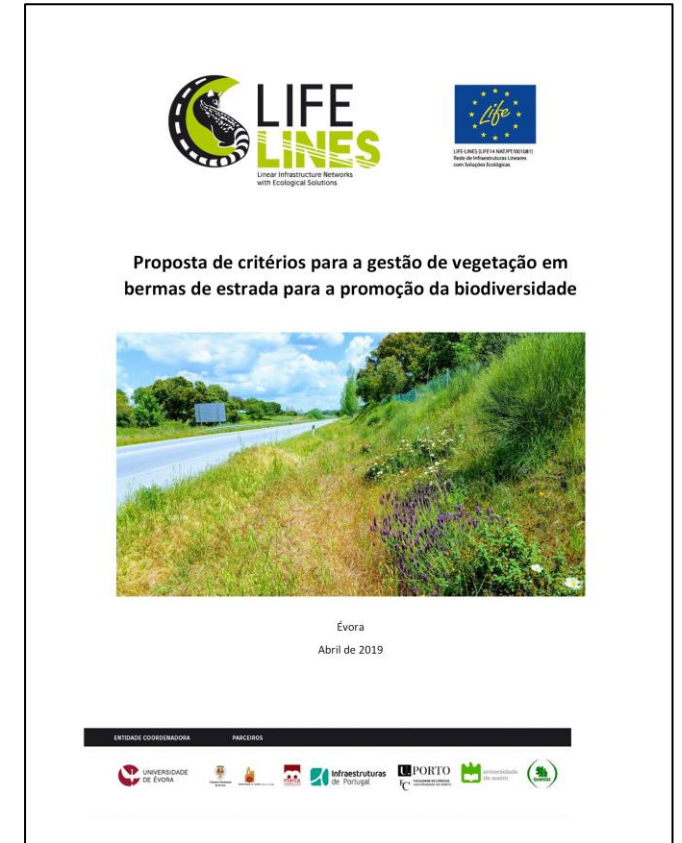
These guidelines are based on landscape context, traffic volume, roadkill menace and fire ignition/spreading risk



Verge M1075 – uncut vegetation strip between intervened verge and land mowed by land owner



Verge M535 – Strip of uncut vegetation on inner verge side.



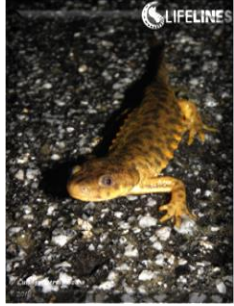
LIFE LINES project – an opportunity to learn, experiment, implement, increase biodiversity



Used solutions inspired by nature



Increased fauna trends



Increased flora richness and abundance



Tested ecological solutions and assessed of their effect



Improved green infrastructures

Helped maintaining healthy ecosystems, connecting natural and semi-natural areas by restoring damaged habitats



Decreased the risk of fauna roadkill



Impact on Nature & Biodiversity



lobbying for support of these solutions with relevant authorities





**LIFE LINES project – an opportunity to learn,
experiment, implement, increase biodiversity**



By working together, learning together, we made a difference!



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Thank you for your attention



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